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Heavy, Medium & Light Grain
Rations in Fattening Lambs

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Heavy, Medium and Light Grain Rations in Fattening Lambs

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I. D. Allison.

Thesis for the Degree of

Bachelor of Science in Agriculture

in the

College of Agriculture

of the

University of Illinois.

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June 1, 1906

THIS IS TO CERTIFY THAT THE THESIS PREPARED UNDER MY SUPERVISION BY

Chas. Dent Allison
ENTITLED Heavy, Medium and Light
Grain Rations for Fattening Lambs

IS APPROVED BY ME AS FULFILLING THIS PART OF THE REQUIREMENTS FOR THE DEGREE

OF Bachelor of Science in Agriculture

Herbert W. Mumford
HEAD OF DEPARTMENT OF Animal Husbandry

CONDITIONS SUGGESTING THE EXPERIMENT.

For general practice it has been found that a three year rotation which includes clover, or some other legume, is one of the most profitable plans to follow in Illinois. The question at once arises in our minds; if this system of clover farming should become general what would be the quantity of clover hay produced; where would there be a market for it; and how could it be disposed of to the best advantage? At present there seems to be only one outlet to the average farmer for large quantities of clover hay and that is in feeding it to live stock. But clover hay alone will not produce a prime finished product, consequently some grain must be used. Then comes the question; what is the minimum amount of grain and maximum amount of hay in the ration which will produce the largest net returns? It was this thought that lead to the following experiment.

In consulting Professor Henry's "Feeds & Feeding" we find "In general, taking the available data we have presented for the basis, it may be stated that about 1000 pounds of grain will be required for 100 pounds gain with well-fattened steers on the average, besides 500 pounds of coarse food in the shape of hay, stover, etc." On page 522 of the same volume Professor Henry says, "that about 500 pounds of corn and 400 pounds of clover hay may be regarded as the standard allowance for producing 100 pounds of gain with lambs where all conditions are favorable." In the light of these statements we conclude that 100 pounds of mutton can be produced on 50% less grain and 20% less clover hay

than 100 pounds of beef. Presuming other things to be equal it is very clear that sheep feeding as a means of disposing of the largest quantity of roughage with a minimum addition of concentrates in the producing of meat products stands much superior to any other live stock feeding.

Live stock statistics today show that there is a greatly increasing demand for feeding lambs throughout the country and that there is also a rapidly increasing mutton consumption. These facts indicate that the sheep feeding business must be remunerative. The low cost of gains produced on lambs, making large selling margins unnecessary, is strong evidence to the practical farmer that sheep feeding is a good business to engage in. The great risk in the business, on the other hand, lies in the fact that lambs are delicate eaters and require great exactness in all work connected with them in order to secure the greatest success.

P L A N

For this experiment it was desired to secure four lots of ten lambs each. Each lot was to be fed all the roughage it would consume. The grain rations were to be the same for all lots varying only in amount as follows: Lot I was to have a full grain ration; Lot II two-thirds as much grain as Lot I, and Lot III one-third as much grain as Lot I. Lot IV was to be fed roughage only. An effort was made to carry out the work along lines that would conform as closely as possible to those used and likely to be used on Illinois farms, for it adds greatly to the economic value of an experiment of this sort if it can be made fully

fully practical at every point. To carry out this idea it was decided not to keep a record of the waste hay; the coarse stems not consumed by the lambs. In almost all investigations in sheep feeding we find great eagerness to count out waste or uneaten roughage which amounts in some cases to as high as 15% of the total amount fed. From the standpoint of the farmer the total amount of hay fed must be charged to the lambs because it is the amount he pays for when weighed to him over the scales, or would be the amount he could sell in the same way. The portion which the lambs refuse to eat is of no practical financial value to the farmer except that it is used for bedding and has some small manurial value upon which the farmer is at present unwilling to make a cash allowance in figuring on his feeding operations.

OTHER INVESTIGATIONS.

No experiments have ever been conducted with an effort to throw light directly on the point attempted in this feeding trial. All experiments, however, bear on the subject to a certain extent for by a complete classification of them, and a study of the results of those where heavy, medium and light grain rations have been fed, some idea may be secured as to the relative merits of the various methods. Until some descriptive standards, yet unknown, are devised which are sufficiently accurate to convey an accurate idea of the animals used, and their capacity to produce, there will continue to be a woeful groping in the dark as attempts are made to interpret and apply the findings of some feeding experiments.

The experiment recorded in Montana Bulletin No.35 includes a variation in the relation of grain and coarse food fed to the various lots. Sheep of different ages were used and the proportion of grain in the ration was calculated to conform to the age of the animals used. Of the "Summary of Facts" recorded in this bulletin the following are worthy of note here.

"The feeding of lambs for market is more profitable than wethers or ewes, providing the ration is so adjusted as to give their rapid increase a finish.

Owing to the growthy tendency of the lamb, its ration must possess more fat producing material than the mature sheep.

Where grain is not available, the mature wether, though making a smaller proportionate increase, will fatten more readily than the lamb on clover or alfalfa alone. The use of from one half to three quarters of a pound of grain, along with clover or alfalfa, throughout a period of from 70 to 90 days, is necessary to produce a proper finish for shipping."

Montana Bulletin No.31 contains some facts on the subject of "Clover Versus Grain Hay for Fattening Lambs." Two lots of 53 lambs each were fed for 60 days, one on clover only, the other on grain hay. The grain hay was made from a mixed sowing of spring wheat, oats, barley and peas in equal amounts, cut while in the dough stage. The gain per head per month from the clover fed lot was 7 pounds while from the grain hay lot it was only 5.34 pounds. It required 14 pounds of clover to produce a pound of gain while of the grain hay 18 pounds were necessary.

In a Montana Station test of 1900, only 11.8 pounds of

clover hay were required to maintain a sheep and produce one pound of gain, which means 169.5 pounds of mutton per ton of clover fed alone. Such results can be obtained only under ideal conditions and with a very superior quality of hay.

SHELTER, WATER SUPPLY AND FEED LOTS.

Shelter was provided in the north half of a long, well ventilated shed where pens were arranged side by side. Each lot had a shed space of about 85 square feet. Along one side of these pens, fastened to the partition, extended the feeding racks which were of the ordinary pattern, hay rack and feed trough combined. There was no more than room enough for the ten lambs at the trough as they developed in size towards the end of the experiment. At the north of the shed small lots were provided each about nine by thirty two feet in size which gave the lambs ample room for their out-of-door quarters. It is believed that it might have been better had this out door lot been somewhat smaller so the lambs could not have taken so much exercise, but it was necessary to extend the lots thirty two feet in order that the lambs might have sunshine. Former experiments have clearly shown that lambs fatten best when they are not permitted much exercise. Each lot was provided with water carried to them in buckets twice a day, morning and evening. In cold weather care was taken to see that ice did not interfere with the lambs getting all the water they wanted. To prevent the buckets being upset they were placed in small stands constructed for the purpose. On stormy nights the lambs were shut in the shed and not allowed to lie out in rain or snow.

LAMBS USED.

The lambs used averaged about 55 pounds in weight at the beginning of the experiment. Lambs of approximately this size are much the most desirable for feeding for various reasons. They are at an age when their appetites are good, and the digestive and assimilative powers are most active, consequently larger gains are produced; a smaller margin per pound between the purchase and selling price is required to come out even; larger profits are usually the result. The greatest demand of the market today is for lambs of good quality, fat and weighing from 75 to 85 pounds. In selecting 55 pound lambs the plan was to have them at a weight which, by adding 25 pounds during the feeding period, would bring them to the desirable market weight and finish. It was thought that this could be done with proper feed and care in a period of about 110 to 115 days, which from former experiments and practical work is a very conservative estimate.

The lambs were Westerns, bought at the Chicago market by Clay, Robinson & Co., on August 31st, 1905. They were selected from a band of 350 with the idea of securing lambs as uniform as possible and to avoid getting any weak, debilitated or unprofitable specimens. They were only an average of the flock as is shown by the fact that the lambs which were selected and the balance of the band both brought the same price on the market, namely: \$6.50 per hundred weight. This was at a time when there was an unprecedented demand for feeding sheep and lambs of every description. In the financial statement submitted the cost price has arbitrarily been set at six cents per pound.

The lambs were bred by N. P. Wilson of Soda Springs, Idaho, and were born from May 15th to 20th being about 100 days old when they arrived at the University farm. They were of mixed breeding, said to be sired by a grade Cotswold ram and out of ewes having about half Shropshire and half Merino blood. Many of the characteristics of these breeds were distinctly shown by various animals. Some were very wrinkley and showed a preponderance of Merino blood. Others carried the covering and style of the Shropshire. All were more or less rangy, upstanding and leggy showing Cotswold tendencies, while some were also very open fleeced and poorly covered with wool. They had been raised on the range under very dry conditions and were typical of lambs generally found in such regions.

In transportation from the far west to the Chicago market they had been necessarily subjected to a long ride, and had received scarcely any feed so that they had suffered about all the shrink it was possible to get out of them. Before being shipped out of the Chicago yards they were all dipped. They arrived at Champaign on September 1st; were taken at once to the University farm, weighed, and turned out upon a somewhat dry blue grass pasture. With this pasture and a good water supply they made a fill of three pounds per head in three days.

For the next thirty days, or until September 30th, the lambs ran in the pasture. During the last week in September they were placed in a shed at night where was provided a supply of clover hay in racks. This was done to get them acquainted with the feed before beginning the experiment. On September 23rd a second dipping was given, and on the 30th or thirty days after their

arrival from Chicago, they were divided into four uniform lots and placed in the feeding pens. The weight of the entire flock taken at this time showed that not a pound of gain had been made after the fill of the first three days, or that they weighed the same on September 30th as on September 4th. It is not known why this should have been the case for the lambs all seemed thrifty, active and of ordinary vigor. The only explanation which can be offered here is that they had been undone by the change of environment for during the month of September the weather was so unusually warm that even native lambs did not make gains.

After the lambs had been carefully divided into four lots of ten each, so as to have all lots as uniform as possible, they were started on a short preliminary feeding. This was for the purpose of accustoming them to grain and feed lot environment before beginning the record of the experiment. The feed given was bran and oats in equal quantities. This was started at two pounds per day per lot or only enough to acquaint the lambs with grain. This was slowly increased until at the beginning of the experiment one week later they were getting 3.75 pounds of grain, with the exception of Lot IV which received no grain at any time. They each received all the hay they would consume.

The experiment proper began on Saturday, October 7th. In Order to secure an accurate initial weight three weighings were made on three consecutive mornings, the weights being taken about 6.30 a. m. before any feed or water had been given. These weights taken on Friday, Saturday and Sunday, were averaged and this average used as the initial weight. The record of feed began

with the amount given on Saturday. During the week of the preliminary feeding each lamb of the four lots was given an ear tag bearing a number. This was for the purpose of identification when individual weights were taken. The second of the three initial weighings was a weighing of each lamb separately on small platform scales. These individual records show facts of great interest.

FEEDS USED.

The feeds used were corn and clover hay with a little bran and oats at first to give bulkiness and to prevent any injurious effects which might result from the sudden change to an exclusive corn diet. All the concentrates used were of good quality. The clover hay, however, was very poor throughout the entire experiment. Some of it was so musty and mouldy that the lambs rejected it entirely while other quantities were so coarse and stemmy that there was as high as a 20% waste. Only a small part of the hay fed could be considered satisfactory for sheep feeding. This will in a measure explain why such a large amount of hay was fed per 100 pounds gain. The necessity of a good quality of hay for sheep is a point which must bear considerable weight when considering the advisability of feeding them a hay crop.

METHOD OF FEEDING.

Feed and water were given twice daily; about 7:00 a. m. and 5:00 p. m. The troughs were cleaned of dirt and stems and the grain given first. Hay was then fed without waiting for the lambs

to clean up the grain. It was the plan to give Lot I all the grain they would take without getting off feed. Because of very changeable weather, however, Lot I did go off feed at different times. This would occur after cool days when it would turn warm and rain. With lambs on full feed it is always necessary to watch them very carefully when the weather turns rainy, and it is usually advisable to reduce the feed somewhat as a safeguard against going off feed. The amounts of grain fed Lots II and III were two-thirds and one-third respectively of that fed Lot I except in cases where Lot I was off feed and the quantity given this Lot was greatly reduced.

It will be noticed from the table of feed consumed that Lots II and III did get a trifle more feed than was originally planned. All the clover hay was given that each lot would consume. It was a noteworthy fact in this connection that, relatively, Lot III ate more hay and left less waste than any other Lot. The small amount of grain they were allowed seemed to stimulate their appetite for hay, for as consumers of clover hay of poor quality, they were an exceptional lot.

An interesting difference between the Lots was noticed in their activity about the pens and at the weekly weighing periods when each Lot was driven down an alley to the scales. Lot I, except when off feed, was more lively than any of the others. Lot II was almost as alert while Lot III was very noticeably slower and Lot IV which received hay only was very quiet and sluggish.

In considering the relation of grain to roughage it must be borne in mind that when the amount of grain in the ration is decreased the effect upon the lambs will be decidedly different

than when a high grain ration is maintained. It is commonly known that where fatness is desired instead of growth a large percentage of fattening grains must be given in the ration to produce this result. If the grain ration is diminished there will be a larger consumption of roughage, as is evidenced by a study of the feeds consumed as shown in Table I. This large consumption of roughage causes the animal to develop in size rather than to put on fat and finish. After reaching a certain stage of maturity it will then proceed to acquire a finish on the same grain ration which it at one time failed to finish on. Older animals consequently require a less heavy grain ration to bring them to the proper degree of ripeness than younger animals. In this experiment the difference in this respect was much more pronounced than the prices received for the animals would indicate. Lot I which made only 17 pounds more gain than Lot II had a very much better finish than Lot II would have acquired by the addition of 17 pounds to their weight with the ration they were receiving. This feature of the experiment could not be properly taken care of for it was necessary to market all the lambs at the same time. If there had been a car load in each lot, and it had been possible to hold each load until they had acquired exactly the same degree of ripeness; then by putting each lot on exactly the same market, accurate comparative results might have been secured. It is very evident, however, that a lot of lambs fed on a heavy grain ration will fatten sooner than a similar lot receiving only two-thirds as much grain. Unless the pounds of gain which produce the desired finish on the lambs are made more cheaply by a lighter

grain ration there is nothing gained in feeding by that method. When hay is cheap, however, cheaper gains can be made by feeding more roughage and under these circumstances it is desirable to take more time for the fattening period, providing a finish can thus be secured without making the lambs too heavy. This experiment failed to demonstrate this point because Lots II and III were marketed too soon. The medium and light grain rations will undoubtedly make the lambs heavier before they are finished than the heavy grain ration would but it is not known how much heavier they would be or how it would affect the profits.

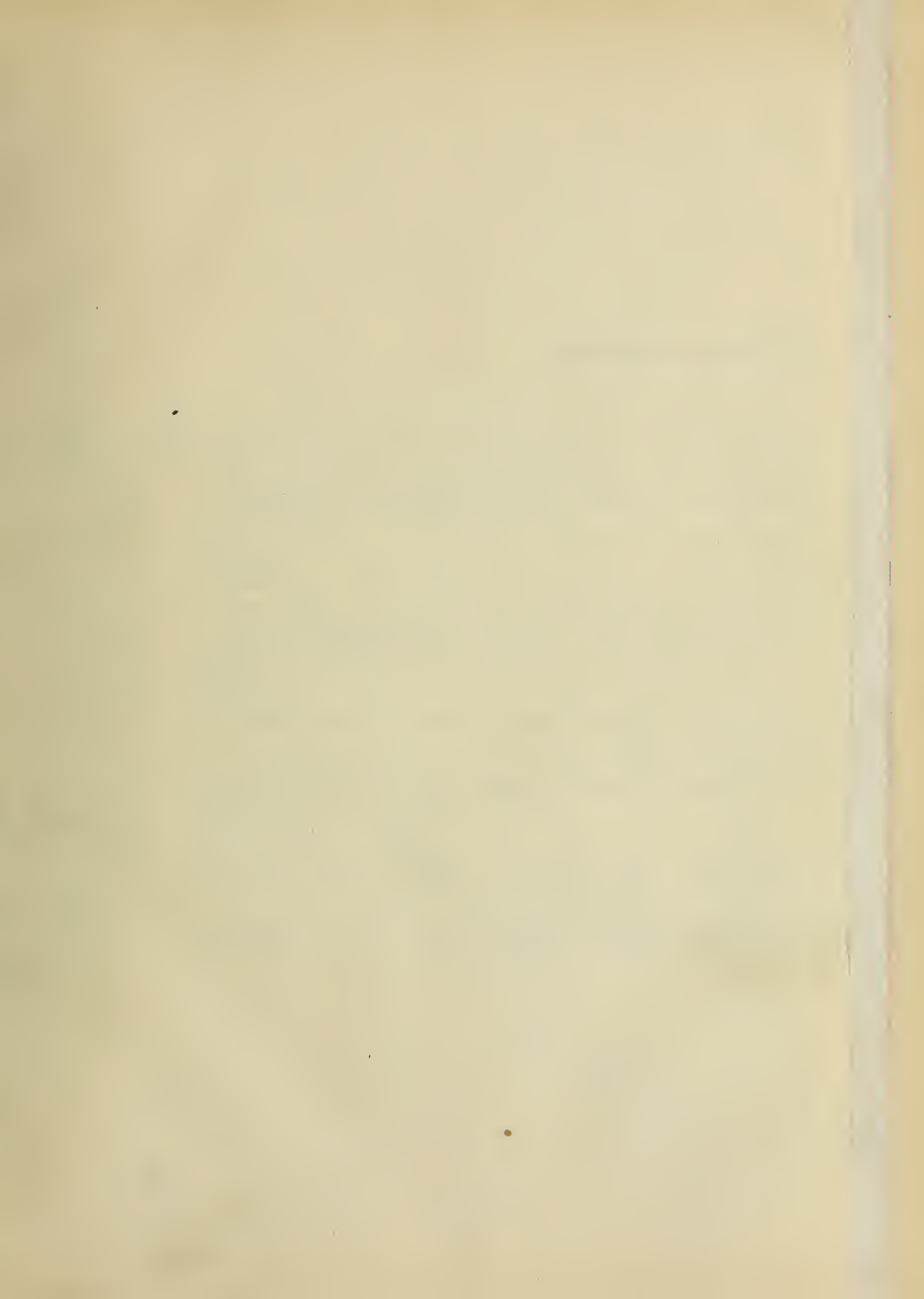
To determine which method of feeding is the most profitable it is obvious that each lot must be fed until finished, which would bring the light grain fed lots upon the market some time later than the heavy grain fed lot. In doing this another difficulty is encountered. The market is never the same on any two days. When the heavy grain fed lot is marketed the price may be very different for a given quality than when the second lot is marketed. Unfortunately too it seems to be necessary at the present stage of our ability to handle problems in animal feeding to interpret results in terms of dollars and cents, that is, by the price the product brings on the market and the "profit". Quality and finish cannot be described in a manner which will give an idea of much practical value in regard to the animals under consideration. But if the animals go to market, the top is perhaps 7¢ and the load sells for 6-1/2 ¢ it requires but few terms beyond a clear understanding of the market to convey a somewhat satisfactory idea of what the product was.

When these lambs were marketed the Lots ranked in finish according to the amount of grain they had been receiving. Lot I was pronounced good. Three lambs, two of Rambouillet type and one that never fed well, made this Lot grade under the best Western lambs. They sold for \$7.25 per hundred weight. Lot II was fairly good but still not high enough in finish for the market demand and consequently sold 25¢ per hundred weight under Lot I bringing \$7.00. Lot III was considered fair but quite appreciably under market requirements. The difference between Lots II and III, however, was not sufficient in the eyes of the buyer to make a difference in the price so this Lot brought \$7 per hundred weight as did Lot II. The lambs of Lot IV were considered good heavy feeders, possibly passing as common killers.

A statement was secured of the dressed weight and percentages of the first three Lots which is as follows:

Lot	Live weight	Dressed weight	Percentage
I	83	47.7	56.90
II	81	43.1	53.02
III	76	38.2	50.02

They were dressed with the caul on which makes about 2-1/2% to 3% more than dressed round.



POUNDS OF FEED FED BY PERIODS OF ONE WEEK EACH.

Lot	Feeds	P e r i o d s															Total
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
I	Corn	8.59	51	69.78	70.41	84	92	88	89.5	106.5	115.5	115.5	115.5	101.7	113.5	90.75	1312.23
	Oats	33.73	33	20.72	17.59												105.04
	Oil meal						4.5	10.5	10.5	10.5	10.5	10.5	10.5	9.2	10.	8.25	95.00
	Bran	5.43															5.43
	Clover hay	137	140	96	99	89	100	106	98	104	80	87	98	90	93	77	1494.00
II	Corn	5.78	34.01	63.34	60.89	57	59.5	58	63	72	77	77	77	75	76.5	60.5	916.52
	Oats	22.50	21.98	18.66	15.11												78.25
	Oil meal						3.0	7	7	7	7	7	7	7	7	5.5	64.50
	Bran	3.63															3.63
	Clover hay	140	148	133	126	138	142	135	140	140	132	134	112	116	132	110	1978.00
III	Corn	2.24	17	31.66	30.44	28.5	29.75	29	31.5	36	38.5	38.5	38.5	36.5	38	30.25	457.04
	Oats	12.01	11	9.34	7.56												39.91
	Oil meal						1.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	2.75	32.25
	Bran	2.05															2.05
	Clover hay	147	180	173	171	182	187	184	182	204	190	195	194	186	196	154	2725.00
IV	Clover hay	162.5	206	204	197	195	212	216	212	210	220	213	220	207	226	175	3075.50

Table I shows the feed fed by periods of one week each for the entire time. The experiment lasted for 103 days so that period number 15 includes only 5 days. About 45 days were required to get Lot I on full feed. Oats were maintained in the ration for four weeks because of the possibility of an exclusive corn ration causing the wool to shed. Oil meal was then given for the purpose of stimulating appetite and aiding in securing finish. Lot I received .15 pounds per head per day while Lot II was fed .10 pounds and Lot III, .05 pounds. Of the total feed fed Lot I 50.4% was grain; of that given Lot II, 34.9% was grain while Lot III received 16.3% grain.

Table II. WEIGHTS BY PERIODS.

Period	Date of weighing	L o t			
		I	II	III	IV
Initial	Oct. 7	563	559	562	558
1	" 14	580	575	585	580
2	" 21	600	590	590	580
3	" 28	610	610	610	590
4	Nov. 4	615	616	612	598
5	" 11	628	622	618	610
6	" 18	646	648	632	616
7	" 25	666	664	652	634
8	Dec. 2	686	674	664	640
9	" 9	704	692	676	644
10	" 16	750	722	694	648
11	" 23	775	746	720	656
12	" 30	800	772	726	665
13	Jan. 6	810	780	745	670
14	" 13	830	805	770	680
15	" 18	840	819	770	680

The above table gives the weights as taken each Saturday morning before the Lots had received any feed or water. Lot I made its most rapid gain from the 7th to the 12th period while Lot II began at the 5th period to make rapid progress. Lot III seems to

have done best from the 6th to the 14th period. Lot IV made the most uniform gains during the various periods of any Lot.

Table III.

EXTENT AND RATE OF GAINS IN POUNDS.

Lot	Ration	Initial weight	Final weight	Total gain	Gain per head	Av. weekly gain pr.lamb	Av. daily gain pr.lamb
I	Heavy	563	840.5	277.5	27.75	1.88	.27
II	Medium	559	819.5	260.5	26.05	1.76	.25
III	Light	561.5	770	208.5	20.85	1.41	.20
IV	Hay	558.5	680	121.5	12.15	.82	.12

Table III gives the total weight of each Lot at the beginning and at the end of the experiment, the total gain per Lot, the average gain for each individual, and the weekly and daily gain per lamb. The most noticable feature here is the small increase Lot I made over Lot II, only 17 pounds, while Lot II exceeded Lot III by 52 pounds. The gains are all rather low, but particularly so in the case of Lot IV where the gain was only 3.6 pounds per month per head. This gain was doubled by the Montana Station in 1900.

Table IV.
GAINS PER BUSHEL SUPPLEMENTED CORN
AND PER TON HAY.

Lot	Bu. corn consumed	Tons hay consumed	Lbs. gain per bushel corn	Lbs. gain per ton hay
I	23.43	.747	11.84	371.4
II	16.36	.989	15.92	263.4
III	8.18	1.362	25.25	153.0
IV		1.537		79.0

We have given in Table IV the number of bushels of corn and tons of hay fed to each Lot, and also the pounds of gain made for each bushel of supplemented corn and per ton of hay. These figures show how necessary it is to know all the facts when considering the number of pounds of gain per bushel of corn as reported in experiments in sheep feeding. The results given for Lot I are the amounts ordinarily secured.

Table V.

POUNDS OF FEED CONSUMED AND AMOUNT
REQUIRED PER POUND GAIN.

Lot	Pounds of Concent's	Pounds of Roughage	Total Lbs. feed fed	Lbs.Con't's pr.lb.gain.	Lbs.Rough. pr.lb.gain	Lbs.feed pr.lb.gain
I	1517.8	1494	3011.8	5.47	5.38	10.85
II	1062.9	1978	3040.9	4.08	7.59	11.67
III	531.3	2725	3256.3	2.54	13.07	15.61
IV		3075	3075		25.40	25.40

Table V exhibits the total consumption of feed in pounds for each Lot, the pounds of concentrates, roughage and total pounds of feed required per pound gain. It is very striking that in the total pounds of feed consumed all four Lots should be so uniform. Lot III had the best appetite for hay throughout the experiment which accounts for the approximately two hundred pounds of feed charged to this Lot above the other three. It would seem that all the lambs ate all they could; that whether it was in the form of concentrates or roughage their capacity was the same, namely, about 2.9 pounds of feed per day.

Referring again to Professor Henry's "Feeds & Feeding" page 522, we find "that about 500 pounds corn and 400 pounds of clover hay may be regarded as the standard allowance for producing 100 pounds of gain with lambs where all conditions are favorable." Upon this basis no Lot produced average results, Lot I going about one-tenth above the standard in grain consumption and one-third above the standard in hay consumption. This may be due in the case of the roughage to poor quality and heavy feeding.

Table VI.

DIGESTIBLE NUTRIENTS CONSUMED AND AMOUNT
REQUIRED PER POUND GAIN.

Lot	Total in Conc't's	Total in Roughage	Total Dig. Nutrients	Total gain in pounds	Dig.Nut.per pound gain
I	1167.6	661.8	1829.4	277.5	6.59
II	817.1	876.3	1693.3	260.5	6.50
III	408.2	1207.2	1615.4	208.5	7.75
IV		1362.5	1362.5	121.5	13.29

Table Vi is not of much practical value to the stockman yet it is of interest in that it in part accounts for the gains and lack of gains made by the different Lots. The proportion of digestible nutrients to total feed fed decreases greatly where the hay in the ration increases because only 48% of clover hay is digestible. This necessitates the consumption of a great many more pounds of feed to secure a given amount of nutritive material than in the case of a heavy grain ration. This is the chief reason the gains per Lot decrease so appreciably from Lot I to Lot IV which received hay only.

Table VII.

DRY MATTER CONSUMED AND AMOUNT
REQUIRED PER POUND GAIN.

Lot	Total in Conc't's	Total in Roughage	Total dry Matter	Total gain in pounds	Dry Matter per.lb.gain
I	1353.72	1265.42	2619.14	277.5	9.43
II	948.03	1675.37	2623.40	260.5	10.07
III	473.82	2308.08	2781.90	208.5	13.34
IV		2604.95	2604.95	121.5	21.44

In Table VII, which gives the pounds of dry matter fed in concentrates and roughage, and the dry matter required per pound of gain, we again notice a singular uniformity in the number of pounds consumed per Lot. It bears very direct relation to the total pounds of feed consumed per pound gain.

Table VIII.

AVERAGE DAILY RATION.

Lot	Pounds of Concentrates	Pounds of Roughage	Proportion of hay to grain
I	1.466	1.44	1:1.02
II	1.027	1.91	1:0.54
III	.513	2.63	1:0.20
IV	.000	2.96	1:0.00

FINANCIAL STATEMENT.

It is always of great importance to know how much it costs to produce a pound of gain. Not only do we like to know what has been done but what might have been done had prices for feed stuffs been different. With this thought in view the following tables were compiled for each Lot. The hay and corn, which comprised about 90% of the feed used, are taken at various prices while the bran, oil meal and oats are held at the same valuation throughout, namely; \$28 per ton for oil meal, \$17 per ton for bran, and 32¢ per bushel for oats. In the completed financial statement corn is valued at 40¢ and clover hay at \$8 per ton. It is perhaps true that when the prices of feed stuffs are low the price of mutton will be correspondingly low in most instances. The following compilations are self explanatory.

COST OF GAINS PER POUND FIGURING CORN AND HAY
AT VARIOUS PRICES.

LOT I.

Corn per bushel	Hay per ton					
	\$5	\$6	\$7	\$8	\$9	\$10
25¢	4.33	4.60	4.87	5.14	5.41	5.68
30¢	4.75	5.02	5.29	5.56	5.83	6.10
35¢	5.17	5.44	5.71	5.98	6.25	6.52
40¢	5.59	5.86	6.13	6.40	6.67	6.94
45¢	6.01	6.28	6.55	6.82	7.09	7.36
50¢	6.43	6.70	6.97	7.24	7.51	7.78

LOT II.

Corn per bushel	Hay per ton					
	\$5	\$6	\$7	\$8	\$9	\$10
25¢	4.12	4.50	4.88	5.26	5.64	6.02
30¢	4.44	4.82	5.20	5.58	5.96	6.34
35¢	4.75	5.13	5.51	5.89	6.27	6.65
40¢	5.07	5.45	5.83	6.21	6.59	6.97
45¢	5.38	5.76	6.14	6.52	6.90	7.28
50¢	5.70	6.08	6.46	6.84	7.22	7.60

LOT III.

Corn per bushel	Hay per ton					
	\$5	\$6	\$7	\$8	\$9	\$10
25¢	4.38	4.98	5.58	6.18	6.77	7.37
30¢	4.58	5.18	5.78	6.37	6.97	7.57
35¢	4.77	5.37	5.97	6.56	7.16	7.76
40¢	4.97	5.57	6.17	6.67	7.36	7.96
45¢	5.16	5.76	6.36	6.95	7.55	8.15
50¢	5.36	5.96	6.55	7.14	7.74	8.34

LOT IV.

	Hay per ton						
	\$5	\$6	\$7	\$8	\$9	\$10	
	6.37	7.59	8.86	10.12	11.39	12.65	

Table IX.
COST OF GAINS PER POUND.

Lot	Corn per bushel	Hay per ton					
		\$5	\$6	\$7	\$8	\$9	\$10
I	40¢	5.59	5.86	6.13	6.40	6.67	6.94
II	40¢	5.07	5.45	5.83	6.21	6.59	6.97
III	40¢	4.97	5.57	6.17	6.67	7.36	7.96
IV	40¢	6.37	7.59	8.86	10.12	11.39	12.65

Lot	Hay per ton	Corn per bushel					
		25¢	30¢	35¢	40¢	45¢	50¢
I	\$8	5.14	5.56	5.98	6.40	6.82	7.24
II	\$8	5.26	5.58	5.89	6.21	6.52	6.84
III	\$8	6.18	6.37	6.56	6.67	6.95	7.14
IV	\$8	10.12	10.12	10.12	10.12	10.12	10.12

The above table shows in a more compact form which of the Lots are the most economical when the prices of feed stuffs are low or high. With corn at 40¢ and the price of hay varying it is observed that Lot II on \$5 hay is very materially the more economical producer. With hay at \$10, however, Lot II was fed a ration that cost one-seventh more than that fed Lot I. When we hold hay at \$8 per ton and consider corn at various prices we find similar conditions. With 25¢ corn Lot I is a trifle the most profitable but with corn at 50¢ Lot I receives the most expensive ration, Lot III ranks second and Lot II shows up to the best advantage. The principle involved is very simple; when corn is high priced and hay is cheap the grain ration should be reduced and vice versa. But this is not all we need to know.

The great difficulty comes in knowing just how much grain to put into the ration when feeds are at certain prices. It can be seen from Table IX that a variation of 5¢ per bushel in the price of corn made a difference of 42¢ per hundred weight in the cost of gains when a heavy grain ration was fed; and that a variation of \$1.00 per ton in the price of hay made a difference of 64¢ per hundred weight in the cost of gains when a small grain ration was fed as in Lot III.

FINANCIAL STATEMENT

LOT I.

To	10 lambs, 563 pounds at 6 cents	\$33.78
	23.43 bushels corn at 40 cents	9.37
	3.28 bushels oats at 32 cents	1.05
	95 pounds oil meal at \$28 per ton	1.33
	5.43 pounds bran at \$17 per ton	.05
	.747 tons clover hay at \$8 per ton	5.98
	Freight, yardage and commission	2.25
	Total expenditures	<u>\$53.81</u>

By	10 lambs, 830 pounds at \$7.25	\$60.18
	Total expenditures	<u>\$53.81</u>
	Total gain	\$6.37
	Profit per lamb	.637

Margin received	\$1.25
Margin required to come out even	.48

PROFIT PER LAMB FIGURING HAY AND GRAIN AT
VARIOUS PRICES.

Corn per bushel	Hay per ton					
	\$5	\$6	\$7	\$8	\$9	\$10
25¢	1.21	1.14	1.06	.99	.91	.84
30¢	1.09	1.02	.94	.87	.79	.72
35¢	.98	.91	.83	.76	.68	.61
40¢	.86	.79	.71	.64	.56	.49
45¢	.74	.67	.59	.52	.44	.37
50¢	.63	.56	.48	.41	.33	.26

FINANCIAL STATEMENT

LOT II

To	10 lambs, 559 pounds at 6 cents	\$33.54
	16.36 bushels corn at 40 cents	6.54
	2.45 bushels oats at 32 cents	.78
	64.5 pounds oil meal at \$28 per ton	.90
	3-2/3 pounds bran at \$17 per ton	.03
	.989 tons clover hay at \$8 per ton	7.91
	Freight, yardage and commission	2.25
	Total expenditures	<u>\$51.95</u>
By	10 lambs, 810 pounds at \$7	\$56.70
	Total expenditures	<u>51.95</u>
	Total gain	\$4.75
	Profit per lamb	.475
	Margin received	\$1.00
	Margin required to come out even	.41

PROFIT PER LAMB FIGURING HAY AND GRAIN AT
VARIOUS PRICES.

Corn per bushel	Hay per ton					
	\$5	\$6	\$7	\$8	\$9	\$10
25¢	1.02	.92	.83	.72	.62	.52
30¢	.94	.84	.74	.64	.54	.44
35¢	.86	.76	.66	.56	.46	.36
40¢	.77	.67	.57	.47	.37	.27
45¢	.69	.59	.49	.39	.29	.19
50¢	.61	.51	.41	.31	.21	.11

FINANCIAL STATEMENT

LOT III.

To	10 lambs, 561.5 pounds at 6 cents	\$33.69
	8.16 bushels corn at 40 cents	3.26
	1.25 bushels oats at 32 cents	.40
	32.25 pounds oil meal at \$28 per ton	.45
	2 pounds bran at \$17 per ton	.02
	1.36 tons clover hay at \$8 per ton	10.88
	Freight, yardage and commission	2.25
	Total expenditures	<u>\$50.95</u>
By	10 lambs, 760 pounds at \$7	\$53.20
	Total expenditures	<u>50.95</u>
	Total gain	\$2.25
	Profit per lamb	.225
	Margin received	\$1.00
	Margin required to come out even	.70

PROFIT PER LAMB FIGURING HAY AND GRAIN AT
VARIOUS PRICES.

Corn per bushel	Hay per ton					
	\$5	\$6	\$7	\$8	\$9	\$10
25¢	.76	.62	.49	.35	.22	.08
30¢	.72	.58	.45	.31	.18	.04
35¢	.68	.54	.41	.27	.14	.00
40¢	.64	.50	.37	.23	.10	-.04
45¢	.60	.46	.33	.19	.06	-.08
50¢	.56	.42	.29	.15	.02	-.12

FINANCIAL STATEMENT

LOT IV.

To	10 lambs, 558.5 pounds at 6 cents	\$33.51
	1.54 tons clover hay at \$8. per ton	12.32
	Freight, yardage and commission	2.25
	Total expenditures	<u>\$47.08</u>
By	10 lambs, 680 pounds at \$6.75	<u>\$45.90</u>
	Total loss	\$1.18
	Loss per lamb	.118
	Margin received	.75
	Margin required to come out even	.92

PROFIT OR LOSS PER LAMB FIGURING HAY AT
VARIOUS PRICES.

Hay per ton					
\$5	\$6	\$7	\$8	\$9	\$10
.34	.19	.04	-.12	-.27	-.43

INDIVIDUAL WEIGHTS AND GAINS.

LOT I.

Number of lamb	Initial weight	Final weight	Gain
301	57	78	21
302	58	91.5	33.5
303	55	84	29
304	62.5	84	21.5
305	55	89	34
306	53	81	28
307	56.5	82	25.5
308	63	95	32
309	52	79	27
310	51	77	26
	<u>563</u>	<u>840.5</u>	<u>277.5</u>

LOT II.

Number of lamb	Initial weight	Final weight	Gain
311	59	84.5	25.5
312	58.5	75	16.5
313	51	83	32
314	55	87	32
315	50.5	73	22.5
316	53	80	27
317	60.5	91	30.5
318	51	70	19
319	58.5	89	30.5
320	62	87	25
	<u>559</u>	<u>819.5</u>	<u>260.5</u>

LOT III.

Number of lamb	Initial weight	Final weight	Gain
321	64	84	20
322	57.5	77	19.5
323	56	80	24
324	55	70	15
325	53	74	21
326	52	75	23
327	50	68	18
328	57	79	22
329	61	87	26
330	56	76	20
	<u>561.5</u>	<u>770</u>	<u>208.5</u>

LOT IV.

Number of lamb	Initial weight	Final weight	Gain
331	51.5	64.5	13
332	65	72	7
333	54	67	13
334	54.5	62	7.5
335	54	66	12
336	56.5	70.5	14
337	59.5	71	11.5
338	60	77	17
339	57.5	71	13.5
340	46	59	13
	<u>558.5</u>	<u>680</u>	<u>121.5</u>

The foregoing table gives the individual gains of the lambs in the different lots from October 7th to January 18th, the entire period of 103 days. Great variation is noticed in the gains of lambs in the same Lots. In Lot I the poorest gain was 21 pounds and the best 34 pounds. If all the lambs in this Lot had been as good as the five best the gain would have been 313 pounds instead of 277.5 or an increase of 35.5 pounds. This strongly illustrates the importance of selection and elimination in securing feeding stock.

In Lot II there is still wider variation in the gaining capacity of the lambs for while the highest gain was 32 pounds the lowest was 16.5 or almost one-half that of the highest. If the ten lambs in this Lot had all been as good as the five best the gain would have been 304 pounds instead of 260.5 or an increase of 43.5 pounds; showing much more variation than Lot I.

In Lot III the gains range from 15 to 26 pounds. The five best feeders in this Lot produced a total gain of 116 pounds or only 5 pounds less than the five poorest lambs in Lot I whose total gain was only 121 pounds. If all the lambs in this Lot had been as profitable as the best five the gain would have been 232 pounds instead of 208.

In Lot IV the variation in individual gains ranges from 7 to 17 pounds which is the widest percent variation of any Lot. There could be no stronger evidence of the value of uniformity and careful selection to that end.

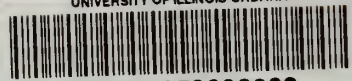
All the lambs were what could be called fairly uniform at the time they were selected for the experiment. At no time did

the appearance of any individuals reveal the fact that there would be the great variation the scales have shown.





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